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γ Coronæ Australis. By E. B. Powell.

The orbit for *γ Coronæ Australis* now submitted has been derived by the graphical method laid down by Sir John Herschel. The accordance between observation and calculation seems pretty fair, except in the case of the later distances; these imply that the distance is increasing, but there appears no doubt of its being on the decrease. By calculating the sectorial areas, the annual sector afforded by past observations does not differ much from ·087 of a square second; but the Windsor (Australia) measures give an area much in excess, indicating that the distances for 1887 and 1888 are very considerably greater than they should be. At the same time, as the agreement between observation and calculation is mainly for the north preceding side of the perspective ellipse, it is possible the apparent orbit does not possess *quite* sufficient width, but turns the southern end *somewhat* prematurely. If this be so, the projected centre of the orbit will be thrown more on the following side, and the position of the periastron will require to be a little advanced. Also, as the method pursued in arriving at the orbit draws some of the elements from α, the position-angle of the periastron, it may be found necessary to modify the dependent elements to a slight extent.

The period and the time of periastron passage were obtained from six equations of mean motion: the separate results were very fairly harmonious, the mean value of P not differing from the extremes by more than about half a year, and the mean value of T differing still less from its extremes.

The orbit agrees fairly well with the measures of Herschel, Jacob (excepting for the epoch 1850·46), and Schiaparelli. The greatest angular discrepancy, $+2^{\circ}\cdot1$, attaches to my own measure for 1870·1, which, as mentioned in my paper published in the *Monthly Notices*, No. 1, for November 1883, was the result of observations taken with an eyepiece of low power, my usual eyepiece having been lost. It seems there is greater difficulty generally in measuring the distance than in taking the angle of position of the star. This I experienced with my 5-foot equatoreal carrying a 4-inch object-glass. The smallness and the equality of the components enable an observer to lay a spider-line pretty accurately across their centres; but, without a tolerably high power, it is far from easy to measure the distance satisfactorily. In my own case the distance was beyond my telescope, and I never did more than make an estimate of it. If I might be allowed, I would suggest that two or three observers possessing powerful telescopes should give attention just now to this binary. The comes is running in to its smaller minimum distance, 1″ or a little more, and careful measures would enable a really excellent orbit to be deduced after the lapse of a few years.

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Elements.

$\alpha = 211^\circ$ $\lambda = 153^\circ\ 21'\ 19''$
$☊ = 49^\circ\ 17'\ 30''$
$\gamma = 48^\circ\ 47'\ 23''$
$e = \cdot 302872$
$P = 93\cdot 338$ years, mean annual motion $= 3^\circ\ 51'\ 25''$ retrograde.
$T = 1885\cdot 192$
$a = 2''\cdot 034$

It would be premature at present to find variations of the position-angles for variations of the elements, and deduce corrections for the latter by means of the method of least squares; I have therefore made no attempt in this direction.

Appended is a comparison of observed and calculated results, in which most of the measures taken are introduced.

Comparison of Observed and Calculated Results.

Observer.	Epoch 1800+.	θ_o	d_o	θ_c	d_c	$\theta_o - \theta_c$	$d_o - d_c$
		°	″	°	″	°	″
Herschel	34·47	37·1	...	37·3	2·56	− ·2	...
,,	35·55	36·8	...	35·7	...	+1·1	...
,,	36·43	34·5	...	34·3	...	+ ·2	...
,,	37·43	32·7	2·66	32·7	2·52	0	+·14*
Jacob	47·32	14·1	2·30	15·0	2·17	− ·9	+·13
,,	50·46	5·9	2·29	7·8	2·02	−1·9	+·27
,,	51·54	4·5	2·26	5·1	1·96	− ·6	+·30
,,	52·49	2·2	1·9	2·6	1·91	− ·4	−·01
,,	53·52	359·0	1·83	359·7	1·86	− ·7	−·03
,,	54·26	356·2	1·71	357·5	1·82	−1·3	−·11
,,	56·44	349·4	1·67	350·5	1·71	−1·1	−·04
,,	57·44	347·4	1·61	346·9	1·66	+ ·5	−·05
,,	58·20	343·4	1·53	344·1	1·62	− ·7	−·09
Powell	59·72	338·1	1½ est.	338·0	1·55	+ ·1	...
,,	61·69	328·8	...	329·4	...	− ·6	...
,,	62·27	325·3	1½ est.	326·7	1·45	−1·4	...
,,	63·84	318·1	...	319·0	...	− ·9	...
,,	70·19	286·9	...	284·8	...	+2·1	...
Schiaparelli	75·65	257·4	1·45	257·0	1·45	+ ·4	0
Howe	76·65	253·1	1·67	252·2	1·46	+ ·9	+·21
Schiaparelli	77·43	248·4	1·49	248·6	1·47	− ·2	+·02
Howe	78·49	242·9	1·47	243·7	1·48	− ·8	−·01
Burnham	79·69	240·0	·87	238·2	1·47	+1·8	−·60
Hargrave	80·67	232·4	1·32	233·7	1·47	−1·3	−·15
Wilson	83·62	217·7	1·62	219·4	1·40	−1·7	+·22
Pollock	86·615	200·6	1·45	202·6	1·27	−2·0	+·18
Tebbutt	87·728	196·2	1·68	195·3	1·21	+ ·9	+·47
,,	88·67	188·7	1·77	188·6	1·16	+ ·1	+·61

* d_o for 37·21 years.

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The following particulars afforded by the orbit may be noted. The greater maximum distance was $2''\cdot58$ nearly, for position equal to $41°$, and for epoch 1832: the annual angular motion was then about $1°\cdot5$. The smaller maximum distance was $1''\cdot48$, for position equal to $244°$ nearly, and epoch about 1878·5. The greater minimum distance was $1''\cdot33$ approximately, for position equal to $297°$, and epoch about 1868. The smaller minimum distance will be $1''\cdot05$ nearly, for position equal to $154°$, and epoch about 1892·8: the annual angular motion will then be nearly $9°$. Thus the greatest annual angular motion will be about six times the least.

Streatham Hill.

A Simple Method of obtaining an Approximate Solution of Kepler's Equation. By Arthur A. Rambaut, M.A.

(*Communicated by Sir R. S. Ball, LL.D., F.R.S.*)

From time to time a good many suggestions have been made for obtaining approximate solutions of the equation

$$u - e \sin u = nt;$$

but, although some of these are very useful when required in the case of one particular orbit, I know of no method, at once so simple and so easily applied to a number of orbits, as the following, which occurred to me when calculating the true anomalies for the binaries, given in Table II. of the following communication.

It depends on the principle that the abscissa of a prolate trochoid, generated by the rolling of a circle along a line parallel to the axis of x, is given by the equation

$$x = a\theta - d \sin \theta.$$

The construction will at once be seen from a description of the apparatus I made for myself, and by the aid of which I was able to obtain u for any orbit, to a quarter of a degree or so in about half a minute.

This degree of precision was, of course, quite sufficient for my purpose, but in various researches connected with double stars, such, for instance, as the comparison of the elements with the data or the construction of an ephemeris, a solution of this kind would, I think, furnish a very good first approximation.

In the figure, MN represents the edge of a straight ruler, glued to a sheet of millimetre paper, about 500^{mm} long and 250^{mm} broad, and which coincides with one of the lines on the paper. PQ is a line drawn at right angles to the ruler, at a distance of about 130^{mm} from the left edge of the paper. At a distance of 102^{mm} from the ruler is a line ROS parallel to it, and graduated to the right and left of PQ in degrees, on the scale of $314^{\mathrm{mm}}\cdot159$ to $180°$. ABD and A′B′D′ represent two

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